

### REMARKS

The Final Office Action dated February 9, 2005 has been carefully reviewed. Claims 1-34 were rejected in the 2/9/05 Final Office Action. By this amendment, claims 26 and 31 have been amended.

#### **35 U.S.C. § 102(b) Rejections - Branvold**

Claims 26-28 and 31-33 were rejected under 35 U.S.C. §102(b) over U.S. Patent No. 3,584,850 issued to Branvold (hereinafter "Branvold"). Applicants respectfully traverse the rejection. Reconsideration of claims 26-28 and 31-33 is respectfully requested.

#### Discussion Re: Patentability of Claim 26

Claim 26, as amended, is as follows:

26. A mineral processing kiln, comprising:  
an inclined rotary vessel having a lower end and an upper end, the rotary vessel having an air inlet opening defined therein at a location between the upper end and the lower end thereof,  
a preheating/precalcining assembly positioned proximate to the upper end of the rotary vessel, the preheating/precalcining assembly comprising a stationary vessel through which (i) mineral passes prior to advancement into the rotary vessel, and (ii) a kiln gas stream passes in contact with the mineral subsequent to advancement out of the rotary vessel,  
a stationary hood positioned proximate to the lower end of the rotary vessel, and  
a burner positioned proximate to the lower end of the rotary vessel.

Hence, claim 26 is directed to those mineral kilns commonly referred to in the art as preheating/precalcining kilns, as opposed to, for example, those kilns commonly referred to as long kilns. The Examiner has pointed to a long kiln in FIGS. 1-4 of Branvold in an attempt to find each limitation of originally filed claim 26. In an attempt to identify a structure relating to the limitation of claim 26 relating to "a preheating/precalcining assembly," the Examiner has interpreted the term "preheating/precalcining assembly" in an unreasonably broad manner. Applicants submit that such a term of art (i.e., a preheating/precalcining assembly) is clearly distinct from any structure on the conventional long kiln of FIGS. 1-4 of Branvold. As noted in the first sentence of MPEP 2111,

"during examination proceedings, claims are given their broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000) (emphasis added). This passage suggests that claims cannot be construed in a vacuum, but rather must be given an interpretation consistent with the specification. Other courts have also applied this standard:

*Since it would be unreasonable for the PTO to ignore any interpretive guidance afforded by the applicant's written description*, either phrasing connotes the same notion: as an initial matter, the PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage *as they would be understood by one of ordinary skill in the art...* *In re Morris*, 127 F.3d 1048, 1054-1055, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997) (emphasis added).

This decision (i.e., *Morris*) is also cited for guidance to patent examiners in MPEP 2111. The *Morris* decision further supports the notion that any "broad reasonable interpretation" proffered by an examiner must take into account terms "as they would be understood by one of ordinary skill in the art". Neither the specification of the present application, nor its common usage in the art, would lead one skilled in the art to believe that the term "preheating/precalcining assembly" means the inlet chute 20d of the long kilns of FIGS. 1-4 of Branvold and the supposed indirect preheating of the mineral therein by the flue gas in the vessel 22a.

However, in an effort to further prosecution of the present application, Applicants have amended claim 26 to recite that the both the kiln gas stream and the mineral passes through the stationary vessel of the preheating/precalciner assembly. This minor amendment more clearly defines the kiln of claim 26 as a preheating/precalcining kiln, thereby distinguishing the invention of claim 26 from the long kiln of FIGS. 1-4 of Branvold relied upon by the Examiner since the long kiln of Branvold does not have such an assembly.

Since Branvold does not disclose each and every element of Applicants' claim 26, Branvold does not anticipate Applicant's claim 26.

#### Discussion Re: Patentability of Claims 27 and 28

Both of claims 27 and 28 include claim 26 as a base claim. As a result, both of claims 27 and 28 are allowable for the reasons hereinbefore discussed with regard to claim 26.

Discussion Re: Patentability of Claim 31

The discussion relating to the patentability of claim 26 is relevant to the patentability of claim 31. For example, claim 31 includes the limitation "a mineral feed assembly operable to heat lime mineral by contact with a kiln gas stream advancing therethrough and thereafter advance the lime mineral into the upper end of the rotary vessel". As a result, claim 31 is allowable for the reasons hereinbefore discussed with regard to claim 26.

Discussion Re: Patentability of Claims 32 and 33

Both of claims 32 and 33 include claim 31 as a base claim. As a result, both of claims 32 and 33 are allowable for the reasons hereinbefore discussed with regard to claim 31.

**35 U.S.C. § 102(b) Rejections - Tutt**

Claims 26-28 and 31-33 were rejected under 35 U.S.C. §102(b) over U.S. Patent No. 5,375,535 issued to Tutt (hereinafter "Tutt"). Applicants respectfully traverse such a rejection of claims 26-28 and 31-33.

Discussion Re: Patentability of Claim 26

The discussion relating to the patentability of claim 26 in regard to its rejection over Branvold is relevant to the patentability of claim 26 in regard to its rejection over Tutt. Specifically, Tutt, as its title implies, is directed to long kilns. The long kilns of Tutt do not include a "preheating/precalcining assembly" as defined by claim 26 (and when properly construed within its meaning in the art). Since Tutt does not disclose each and every element of Applicants' claim 26, Tutt does not anticipate Applicant's claim 26.

Discussion Re: Patentability of Claims 27 and 28

Both of claims 27 and 28 include claim 26 as a base claim. As a result, both of claims 27 and 28 are allowable for the reasons hereinbefore discussed with regard to claim 26.

Discussion Re: Patentability of Claim 31

The discussion relating to the patentability of claim 26 is relevant to the patentability of claim 31. For example, claim 31 includes the limitation "a mineral feed assembly operable to heat lime mineral by contact with a kiln gas stream advancing therethrough and thereafter advance the lime mineral into the upper end of the rotary vessel". As a result, claim 31 is allowable over Tutt for the reasons hereinbefore discussed with regard to claim 26.

Discussion Re: Patentability of Claims 32 and 33

Both of claims 32 and 33 include claim 31 as a base claim. As a result, both of claims 32 and 33 are allowable for the reasons hereinbefore discussed with regard to claim 31.

**35 U.S.C. § 103 Rejections - Branvold**

Claims 1-25, 29, and 34 were rejected under 35 U.S.C. §103(a) over Branvold. Applicants respectfully traverse this rejection. Reconsideration of claims 1-25, 29, and 34 is respectfully requested.

Discussion Re: Patentability of Claim 1

Claim 1 is as follows:

1. A method of operating a mineral processing kiln having an inclined rotary vessel, the method comprising the steps of:  
introducing combustion air and combustible fuel in a sub-stoichiometric ratio through a lower end of the rotary vessel, and  
introducing additional combustion air through an opening in a wall of the rotary vessel at a location between the lower end of the rotary vessel and an upper end of the rotary vessel.

In the 2/9/05 Office Action, the Examiner concedes that Branvold does not teach such a method, but asserts that "[t]o operate the combustion rate at a sub-stoichiometric ratio at the lower end and super-stoichiometric at the upper end is merely an obvious matter of fuel and air adjustment." The Examiner further indicates that "[t]his is well known in the combustion art."

Apparently, in an attempt to arrive at the invention of Applicants' claim 1, the Examiner is modifying the kiln of Branvold to operate at the specific parameters recited in Applicants' claim 1.

The Examiner's proposed modification does not arrive at the invention of claim 1. Indeed, claim 1 recites "introducing additional *combustion air* through an opening in a wall of the rotary vessel...". By contrast, *cooling air* is admitted into the drying zone of the kiln of Branvold through the tuyeres 24e (see, e.g., column 6, lines 64-75). As such, the proposed modification does not arrive at the invention of claim 1.

Not only does the proposed modification not arrive at the invention of claim 1, the Examiner has not put forth a legally sufficient teaching, motivation, or suggestion in support of the proposed modification. It is a fundamental tenet of patent law that a prima facie case of obviousness cannot be established in the absence of some teaching, motivation, or suggestion supporting the modification or combination of the references relied upon in making the rejection. The rule of law for a finding of obviousness under 35 U.S.C. § 103(a) was reiterated recently by the Court of Appeals for the Federal Circuit as follows, "[w]hen patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness." In re Lee, 277 F.3d 1338 at 1343, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002); See also McGinley v. Franklin Sports, Inc., 262 F.3d 1339 at 1351-52, 60 USPQ2d 1001 (Fed. Cir. 2001) ("the central question is whether there is reason to combine [the] references," a question of fact drawing on the Graham factors). The Federal Circuit expounded upon the necessity of finding some teaching or motivation to combine the references *in the references themselves* concluding that "[t]he factual inquiry whether to combine references must be thorough and searching." In re Lee, 61 U.S.P.Q.2d at 1433 (Fed. Cir. 2002). The teaching or suggestion to make the claimed combination *must be found in the prior art*, and not based on applicant's disclosure. In re Vaack, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed

to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

In an apparent attempt to establish a case of obviousness in the present case, the Examiner stated that two-staged combustion would have been obvious "in order to maximize the efficiency [sic] fuel efficiency and reduce pollutants." However, this conclusory statement is completely devoid of any legally sufficient teaching, motivation, or suggestion to modify the mineral kiln of Branvold in the manner proposed by the Examiner. While the Examiner's characterization that two-staged combustion may lead to favorable efficiencies and lower emissions may be technically accurate (i.e., it is true that two-staged combustion can lead to lower emissions in certain technical fields), this statement in no way forms a legally sufficient teaching, motivation, or suggestion to modify the mineral kilns of Branvold in the very specific manner proposed by the Examiner. Indeed, the regurgitation of a well known scientific principal is not *ipso facto* a legally sufficient substitution for the required factual analysis clarified and confirmed in *Lee*.

Moreover, its not merely a matter of whether or not it is well known and obvious "in the combustion art", but rather, the question is whether it would be obvious to modify a method of operating a *mineral kiln*. The claimed invention must be examined as a whole, and obviousness cannot be based on an analysis of only a portion of the claim. It is the Examiner's burden to point to such motivation, and the Examiner has not done so. The unsupported, conclusory statement offered by the Examiner is not a legally sufficient substitution for the factual analysis clarified and confirmed in *Lee*. However, if the Examiner sustains such rejection, the Applicant respectfully requests that the Examiner point with particularity to the section of Branvold wherein such motivation is provided.

Furthermore, not only has the Examiner not offered a legally sufficient teaching, motivation, or suggestion to modify the mineral kilns of Branvold, it is believed that no such motivation exists. Indeed, Applicants respectfully disagree with the Examiner's assertion that "[t]o

operate the combustion rate at a sub-stoichiometric ratio at the lower end and super-stoichiometric at the upper end is merely an obvious matter of fuel and air adjustment.” Irrespective of whether or not such a modification would be obvious in “the combustion art,” Applicants argue that such a modification was certainly not obvious in regard to the operation of a mineral processing kiln. In particular, Applicants argue that at the time of Applicants’ invention, it was commonly believed that injections of unheated air into the cement process downstream of the cooler and the resulting displacement of air from the cooler will result in unacceptable loss of heat recovery. On closer examination by Applicants, calculations revealed that such loss of heat recovery is minimal, especially in view of the benefits of mixing the process gases in high temperature zones. Calculations show that if 10% of the theoretical combustion air is introduced with high energy into the rotary kiln, the displacement of a corresponding mass of preheated air would result in a reduction of the heat recovery from the cooler of less than 2% of the total energy input. The potential gain in process efficiency due to elimination of stratification can more than offset this heat loss. Moreover, by use of such a mixing air substitution scheme, the primary combustion zone at the lower end of the rotary vessel can be operated at a sub-stoichiometric air-to-fuel ratio thereby creating an environment that favorably destroys NO<sub>x</sub> produced in the high temperature rotary kiln and pass through the precalciner/preheater. For at least these reasons, the Examiner’s proposed modification of Branvold cannot be properly construed as “merely an obvious matter of fuel and air adjustment.”

In conclusion, the proposed modification does not arrive at the invention of Applicants’ claim 1. Moreover, the Examiner has not provided a legally sufficient teaching, motivation, or suggestion for modifying Branvold. As a result, the Examiner has not established a prima facie case of obviousness with Branvold in regard to Applicants’ claim 1.

#### Discussion Re: Patentability of Claims 2-6

Each of claims 2-6 includes claim 1 as a base claim. As a result, each of claims 2-6 is allowable for the reasons hereinbefore discussed with regard to claim 1.

Discussion Re: Patentability of Claim 7

The discussion relating to the patentability of claim 1 is relevant to the patentability of claim 7. For example, claim 7 includes the limitations:

introducing combustion air and combustible fuel in a sub-stoichiometric ratio through the lower end of the rotary vessel, and  
introducing additional *combustion air* through an opening in a wall of the rotary vessel at a location between the lower end of the rotary vessel and the upper end of the rotary vessel.

As a result, claim 7 is allowable for the reasons hereinbefore discussed with regard to claim 1.

Discussion Re: Patentability of Claims 8-13

Each of claims 8-13 includes claim 7 as a base claim. As a result, each of claims 8-13 is allowable for the reasons hereinbefore discussed with regard to claim 7.

Discussion Re: Patentability of Claim 14

The discussion relating to the patentability of claim 1 is relevant to the patentability of claim 14. For example, claim 14 includes the limitations:

advancing a first quantity of combustion air into the lower end of the rotary vessel to create sub-stoichiometric conditions in the lower end of the rotary vessel, and  
advancing a second quantity of *combustion air* into the rotary vessel, at a location between the lower end of the rotary vessel and an upper end of the rotary vessel, to create super-stoichiometric conditions in a mid-portion of the rotary vessel.

As a result, claim 14 is allowable for the reasons hereinbefore discussed with regard to claim 1.

Discussion Re: Patentability of Claims 15-18

Each of claims 15-18 includes claim 14 as a base claim. As a result, each of claims 15-18 is allowable for the reasons hereinbefore discussed with regard to claim 14.



Discussion Re: Patentability of Claim 19

Claim 19 is as follows:

19. A method of operating a preheater/precalciner kiln having an inclined rotary vessel, the method comprising the steps of:  
advancing mineral from a preheater/precaliner assembly into an upper end of the inclined rotary vessel,  
advancing mineral from the upper end of the rotary vessel to a lower end of the inclined rotary vessel,  
introducing a first quantity of combustion air and combustible fuel through the lower end of the rotary vessel, and  
introducing a second quantity of *combustion air* through an opening in a wall of the rotary vessel at a location between the lower end of the rotary vessel and the upper end of the rotary vessel.

Hence, claim 19 is directed to a method of operating a preheating/precalcining kiln.

The Examiner has not proposed a modification of Branvold which arrives at the invention of claim 19 for the reasons hereinbefore discussed in regard to claim 1. Moreover, the proposed modification of Branvold does not arrive at the invention of claim 19 for additional reasons. For example, the 2/9/05 Office Action is devoid of any discussion relating to a method of operating a preheater/precalciner kiln (when such a term of art is properly construed) which includes the steps of: "advancing mineral from a preheater/precaliner assembly into an upper end of the inclined rotary vessel" and "introducing a second quantity of combustion air through an opening in a wall of the rotary vessel at a location between the lower end of the rotary vessel and the upper end of the rotary vessel". As such, a prima facie case of obviousness has not been established in regard to claim 19.

Discussion Re: Patentability of Claims 20-25

Each of claims 20-25 includes claim 19 as a base claim. As a result, each of claims 20-25 is allowable for the reasons hereinbefore discussed with regard to claim 19.

Discussion Re: Patentability of Claim 29

Claim 29 includes claim 26 as a base claim. As a result, claim 29 is allowable for the reasons hereinbefore discussed with regard to claim 26.

Discussion Re: Patentability of Claim 34

Claim 34 includes claim 31 as a base claim. As a result, claim 34 is allowable for the reasons hereinbefore discussed with regard to claim 31.

**35 U.S.C. § 103 Rejections - Tutt**

Claims 1-25, 29, and 34 were rejected under 35 U.S.C. §103(a) over Tutt. Applicants respectfully traverse this rejection. Reconsideration of claims 1-25, 29, and 34 is respectfully requested.

Discussion Re: Patentability of Claim 1

The discussion relating to the patentability of claim 1 in regard to its rejection over Branvold is relevant to the patentability of claim 1 in regard to its rejection over Tutt. Specifically, in a similar manner as to the purported obviousness rejections over Branvold, the proposed modification of Tutt does not arrive at the invention of claim 1. Firstly, the "air inlet opening" identified by the Examiner is a kiln bypass system which withdraws a portion of the kiln gas stream from the rotary vessel. The "air" supplied to such a system is the quench air that is used to cool the withdrawn kiln gas (see arrows 134 in FIG. 3). Note that the quench air does not flow into the main body of the rotary vessel. Such quench air could not be properly characterized as combustion air. As such, the proposed modification of Tutt does not arrive at the invention of claim 1.

In addition, the Examiner has provided no legally sufficient teaching, motivation, or suggestion to support the proposed modification of the kilns disclosed in Tutt for reasons similar to as described above in regard to the obviousness rejection over Branvold. Moreover, Applicants are of the belief that no teaching, motivation, or suggestion exists for reasons similar to as described above in regard to the obviousness rejection over Branvold. Since Tutt has not been applied in a manner to create a prima facie case of obvious, claim 1 is not obvious over Tutt.

Discussion Re: Patentability of Claims 2-6

Each of claims 2-6 includes claim 1 as a base claim. As a result, each of claims 2-6 is allowable for the reasons hereinbefore discussed with regard to claim 1.

Discussion Re: Patentability of Claim 7

The discussion relating to the patentability of claim 1 is relevant to the patentability of claim 7. For example, claim 7 includes the limitations:

introducing combustion air and combustible fuel in a sub-stoichiometric ratio through the lower end of the rotary vessel, and  
introducing additional *combustion air* through an opening in a wall of the rotary vessel at a location between the lower end of the rotary vessel and the upper end of the rotary vessel.

As a result, claim 7 is allowable for the reasons hereinbefore discussed with regard to claim 1.

Discussion Re: Patentability of Claims 8-13

Each of claims 8-13 includes claim 7 as a base claim. As a result, each of claims 8-13 is allowable for the reasons hereinbefore discussed with regard to claim 7.

Discussion Re: Patentability of Claim 14

The discussion relating to the patentability of claim 1 is relevant to the patentability of claim 14. For example, claim 14 includes the limitations:

advancing a first quantity of combustion air into the lower end of the rotary vessel to create sub-stoichiometric conditions in the lower end of the rotary vessel, and  
advancing a second quantity of *combustion air* into the rotary vessel, at a location between the lower end of the rotary vessel and an upper end of the rotary vessel, to create super-stoichiometric conditions in a mid-portion of the rotary vessel.

As a result, claim 14 is allowable for the reasons hereinbefore discussed with regard to claim 1.

Discussion Re: Patentability of Claims 15-18

Each of claims 15-18 includes claim 14 as a base claim. As a result, each of claims 15-18 is allowable for the reasons hereinbefore discussed with regard to claim 14.

Discussion Re: Patentability of Claim 19

The discussion relating to the patentability of claim 19 in regard to its rejection over Branvold is relevant to the patentability of claim 19 in regard to its rejection over Tutt. Specifically, the Examiner has not proposed a modification of Tutt which arrives at the invention of claim 19. For example, combustion air is not advanced into the kiln of Tutt in the manner recited in claim 19. Moreover, the Examiner has not identified a location in Tutt, or any other reference, which discloses a method of operating a preheater/precaliner kiln, when the term is properly construed, which includes the steps of: "advancing mineral from a preheater/precaliner assembly into an upper end of the inclined rotary vessel" and "introducing a second quantity of combustion air through an opening in a wall of the rotary vessel at a location between the lower end of the rotary vessel and the upper end of the rotary vessel". As such, a prima facie case of obviousness has not been established in regard to claim 19.

Moreover, even if the proposed modification of Tutt could be construed to arrive at the invention of claim 19, the Examiner has provided no legally sufficient teaching, motivation, or suggestion for modifying the long kilns of Tutt in such a manner. A prima facie case of obviousness cannot be established in the absence of a legally sufficient teaching, motivation, or suggestion.

Discussion Re: Patentability of Claims 20-25

Each of claims 20-25 includes claim 19 as a base claim. As a result, each of claims 20-25 is allowable for the reasons hereinbefore discussed with regard to claim 19.

Discussion Re: Patentability of Claim 29

Claim 29 includes claim 26 as a base claim. As a result, claim 29 is allowable for the reasons hereinbefore discussed with regard to claim 26.

Discussion Re: Patentability of Claim 34

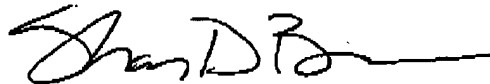
Claim 34 includes claim 31 as a base claim. As a result, claim 34 is allowable for the reasons hereinbefore discussed with regard to claim 31.

Conclusion

In view of the foregoing amendments and remarks, it is submitted that this application is in a condition for allowance. Action to that end is hereby solicited.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time sufficient to effect a timely response and shortages in other fees be charged, or any overpayment in fees be credited, to the Account of Barnes & Thornburg, Deposit Account No. 10-0435 with reference to file 204560-73806.

Respectfully submitted,  
BARNES & THORNBURG



Shawn D. Bauer  
Attorney Reg. No. 41,603

SDB/kim  
Indianapolis, IN  
(317) 231-7313

INDS02 SDB 721894v1